CHAPTER 1

INTRODUCTION

This training manual is designed to help you understand your work in the electronics division. It will also help you meet the requirements for advancement to Electronics Technician (ET) first class and chief. This manual is not the only publication you need to use as you prepare for advancement. You also need to read other publications to be well prepared for the advancement-in-rate examination. This manual provides background information on subjects, but you must study the indicated references to learn each topic in depth.

In this manual we use the terms "ET supervisor" and "electronics supervisor" interchangeably. Although you will be a supervisor in the ET rating, you may also have to supervise personnel from other ratings. The ratings you deal with daily will depend on your command's organizational make-up.

The manual is organized as follows:

This chapter explains how the electronics supervisor has evolved. The section entitled "Sources of Information" identifies publications you should study to advance and to help your subordinates with their careers.

Chapter 2, "Organization and Administration," is divided into two sections. The organization section discusses the electronics organization. The administration section describes the duties and responsibilities of electronics supervisors.

Chapter 3, "Supervision and Training," is divided into two sections. The supervision section describes supervision practices that effective electronics division managers follow. The training section describes the training organization and training procedures in an electronics division.

Chapter 4, "Combat Systems," describes combat system organization. It also describes the naval tactical data system/weapon direction system (NTDS/WDS) and combat system testing.

Chapter 5, "Casualty Control and Reporting," is divided into two sections. The casualty control section describes the electronics casualty control (ECC) organization and its functions. The casualty reporting section describes casualty report (CASREP) procedures.

Chapter 6, "Quality Assurance," explains the concepts of quality assurance and describes the primary QA programs and shipboard organization and procedures.

Chapter 7, "Test Equipment, " describes the programs set up to control test equipment, and your role in managing and maintaining test equipment.

Chapter 8, "Maintenance/COSAL," explains (1) your role in managing the maintenance of electronic equipment, (2) the problems and control of electromagnetic interference (EMI), and (3) your relationship with the supply system.

RESPONSIBILITIES

By becoming an electronics supervisor, you will have taken a big step in your career. Previous advancement brought increased rewards. Along with those rewards came increased responsibilities. The responsibilities of an electronics supervisor are even greater. Your work as a supervisor will be important to the successful management of the Electronics Division. For general information on the advancement system and on the increased responsibilities of a supervisor, review *Military Requirements for Petty Officer First Class,* NAVEDTRA 12046.

By this time in your career, you are valuable as a technical specialist. You are also valuable as a supervisor, leader, and trainer of others. You can, therefore, make far-reaching and long-lasting contributions to the Navy. The extent of your contribution to the Navy depends on your willingness and ability to accept increased responsibility for military matters and for the professional requirements of the Electronics Technician. It also depends on your skill in getting other people to work for you.

You will find that your responsibilities for military leadership are much the same as those of petty officers in other ratings. Every petty officer is a military person as well as a technical specialist.

Your responsibilities for technical leadership are directly related to the nature of your work. Operating and maintaining the ship's electronic equipment is a vital job. It's a teamwork job requiring a special kind of leadership ability. This leadership ability can only be developed by personnel who have a high degree of technical competence and a deep sense of personal responsibility.

At this point, let's consider some of the broader aspects of your increased responsibilities for military and technical leadership.

RESPONSIBILITIES WITHIN THE ELECTRONICS DIVISION CHAIN

You will be expected to translate the general orders given by officers into detailed, practical, on-the-job language that even relatively inexperienced personnel can understand and follow. In dealing with your juniors, you must see that they perform their work properly. You must also be able to explain to officers what your juniors may need or problems they may experience.

RESPONSIBIILITIES FOR TRAINING

Training is essential. Even if you are blessed with a highly skilled and well-trained electronics force, you will still find training necessary. For example, some of your best workers may be transferred and replaced by inexperienced or poorly trained personnel. Often, a job may call for skills your assigned personnel do not have, especially if your division must maintain new equipment. These and similar problems require you to be a training specialist who can conduct both formal and informal training programs. You must train individuals and groups to work safely, neatly, accurately, and with a spirit of cooperation.

RESPONSIBILITIES TO SUBORDINATES

Any discussion of responsibilities must include the responsibility you as a supervisor have toward your subordinates. You are responsible for developing their professional and general military skills. You must also help them to become mature, competent technicians who are prepared to assume supervisory responsibilities. You must teach them and encourage them to usc their skills and knowledge to make decisions. You must then support those decisions when they are correct and fair. However, you must also advise or counsel your subordinates when their decisions may cause harm to themselves, others, or their equipment. Use the "learn by mistakes" theory to teach your subordinates. But be constantly aware of what is happening to be sure the lessons taught are worth the consequences, should problems develop.

You as a supervisor have an overriding responsibility to take care of your people before caring for yourself. This responsibility requires steadfast devotion to your subordinates. Gaining the loyalty of subordinates requires unselfish actions on the part of seniors.

TAKE CARE OF YOUR PEOPLE AND THEY WILL TAKE CARE OF YOU!

RESPONSIBILITIES TOWARD OTHER RATINGS

As you advance to ET1 and then to ETC, you will find that your plans and decisions can affect many people. Some of these people may not be in your division or even in the operations department. It becomes more and more important, therefore, for you to understand the duties and responsibilities of personnel in other ratings. Every petty officer in the Navy is a technical specialist in a particular field. Learn as much as you can about the work of other ratings. Plan your own work to fit in with the overall mission of the organization.

EFFECTIVE COMMUNICATION

The basic requirements for effective communication are knowledge of your own language, knowledge of standard naval terminology, and precise use of technical terms. Knowledge of your own language includes using correct language when you speak and write. Remember, the basic purpose of all communication is understanding. To lead, supervise, and train others, you must be able to speak and write so they understand exactly what you mean.

Standard naval terminology consists of words that express ideas usually understood or procedures used only by those in the Navy. When a situation calls for the use of standard Navy terminology, use it.

Use technical terms with precision. A command of the technical language of the Electronics Technician will help you receive and pass along information accurately. It will also help you exchange ideas with other technicians. If you don't understand the precise meaning of the terms used in your rating, you may not be able to understand the content of technical publications. Although the correct use of technical terms is always important, it is particularly important when you are

dealing with lower rated personnel. If you are sloppy in your use of technical terms, you will likely confuse them. This may cause them to do work in an improper or unsafe manner.

Just as you ensure accuracy and clarity in communicating with your juniors, you must also remember to communicate effectively with your superiors. You must be aware of what technical knowledge, if any, your superiors have. Many times you will be called upon to work for junior officers with no prior experience in the electronics or combat systems field. You are responsible for keeping them aware of all matters concerning the systems and personnel under your control.

PROFESSIONAL UPDATES

Practically everything in the Navy–policies, procedures, equipment, systems, publications–is always in various stages of development and revision. As an electronics supervisor you must stay informed of all changes and new developments that might affect your work.

Some changes will be called directly to your attention. Others you will have to look for. Try to develop a special alertness for new information, especially technical information on electronics and associated equipment and systems. New types of equipment and systems are constantly being designed and tested. Existing types of equipment are modified. If you follow the history of electronics since the end of World War II, you will find that several important changes have occurred. Designers of new electronic equipment have designed several functions into a single piece of equipment as a self-contained system. This approach replaces combining several pieces of single-function equipment into a system. The size of electronic equipment has decreased as electron tubes have given way to transistors. Smaller and more reliable electronic components such as capacitors, resistors, transformers, and coils have been developed. Microcircuits are common. In addition, computers have become more prominent in the systems you now work with. The Electronics Technicians of today must perform maintenance on a wider variety of equipment than ever before. As a supervisor, you must be aware of all changes that are happening in the electronics field.

STANDARDS

How do standards apply to you as an electronics supervisor? Let's start with a definition. We can define a standard as something set up by either custom or authority to measure quality, quantity, performance, or service. As a supervisor you must be sure that the standards set by the Navy, your ship and division, and you are met. Four standards that you will deal with on a continuing basis are as follows:

- Naval Standards
- Occupational Standards
- Personnel Qualification Standards
- Equipment Standards

Use these standards to develop a training program for your division that will encompass all aspects of your subordinates' rating.

NAVAL AND OCCUPATIONAL STANDARDS

The *Manual of Navy Enlisted Manpower and Personnel Classifications and Occupational Standards,* NAVPERS 18068, (commonly called the Occupational Standards Manual) lists the minimum skills requirements for each rate within each rating. You are probably familiar with much of the following information. However, we will review it to help you work with your lower rated personnel.

Naval Standards

Section I of the Occupational Standards Manual lists the naval standards for each paygrade. These are the skills and knowledge essential to the overall effectiveness of the enlisted personnel in the performance of their duties. Naval standards encompass:

- Military requirements
- Essential virtues of professionalism
- Pride of service in support of the oath of enlistment
- Maintenance of good order and discipline

Basic skills and knowledges concerning the well-being of Navy personnel

Naval standards are the basis on which the military requirements training manuals and military/leadership examinations are developed. An example of an E-6 naval standard is

NAVSTD 944601– Write enlisted performance evaluations.

Note that a naval standard is a task statement that is not rating specific. All E-5 personnel in the Navy should be able to perform this task before taking the military/leadership test for E-6.

In addition to being used to develop the military/leadership exams, naval standards are used for curriculum development at basic training commands and apprentice training facilities.

Occupational Standards

The Occupational Standards Manual also lists the Navy occupational standards for each rating. We should mention again that the standards listed in the Occupational Standards Manual are only the minimum requirements for enlisted occupational skills. The content of this training manual *(ET Supervisor Volume 1-Administration)* is based on the occupational standards for ET1 and ETC. The Occupational Standards Manual is kept current by numbered changes. However, these changes are issued more frequently than most training manuals can be revised. Therefore, the training manuals cannot always reflect the latest occupational standards. Since the advancement examinations are also based on the Navy occupational standards, you should always check the latest changes to be sure your personnel know the current requirments for advancement in the rating. An example of an occupational standard for Electronics Technician First Class is

OCCSTD 4436– Troubleshoot electronic systems and subsystems.

Note the difference between the naval standard given in the previous section and the occupational standard shown here. The occupational standard is rating specific and cannot be performed by all Navy personnel going up for Petty Officer First Class.

Occupational standards are used in the development of training manuals and rating advancement exams. They are also used in the development of class A and class C school curricula, formal shipboard training, OJT, and general rating training for divisions.

Personnel Qualification Standards

The Personnel Qualification Standards (PQS) program is a qualification system used to certify that officer and enlisted personnel can perform certain duties. A PQS is a list of minimum knowledge and skills necessary to qualify for a specific watch station, maintain specific equipment, or perform as a team member within a unit. The PQS program is not designed as a training program, but provides many training goals. Therefore, you should use PQS as a key element to make your training program well structured and dynamic. A complete listing of available PQS manuals is published in the *Personnel Qualification Standards Catalog*, NAVEDTRA 43100.

An example of a knowledge/skill that is part of the PQS for Electronics Casualty Control (ECC) Repair 8 is

PQSSTD 101.2– Discuss the purpose and use for antenna cutout switches.

In this example the person must show a knowledge of how something operates. Not all PQS skills are knowledge statements. Some require physical demonstrations by the person wanting to be qualified.

Depending on your command, you may be responsible for all or part of the following duties within the division PQS program:

- Supervise Divisional PQS.
- Supervise Qualification Petty Officers.
- Recommend to the Department Head the assignment of Division Qualification Petty Officers.
- Recommend to the Department Head the entry level of newly assigned personnel.
- Recommend to the Department Head any required tailoring that a division may need.
- Recommend final qualification to the Department Head.
- Be sure that Page Four Service Record documentation of PQS is accomplished.
- Assign requirements and PQS goals to individual trainees according to departmental guidance.
- On a weekly schedule, check the progress of division personnel toward PQS goals as shown on the Progress Records.
- Brief the Department Head monthly on the status of division personnel and adjust goals accordingly.
- Integrate PQS status with routine administration of special requests, early liberty approvals, etc.
- Be sure that enlisted evaluations reflect PQS qualification accomplishments.

– Be sure that a reference library is maintained.

Equipment Standards

Not all standards pertain to the development of your personnel. Equipment standards fall into this category. Equipment standards, or operational parameters, are standards that are set for individual equipments to be sure they operate at maximum performance. These standards may be determined by the equipment's manufacturer, the Navy's planned maintenance system (PMS), or other authority.

An equipment standard for a radar maybe stated as:

Transmitter Frequency: 9375 $\pm$ 30MHz

This standard gives the operational parameters within which this specific radar transmitter should operate. If the transmitter were to begin operating outside the prescribed standards you would need to perform corrective maintenance.

In chapter 3 of this training manual, we will discuss how you should use standards in your division training program.

STUDYING YOUR TECHNICAL MATERIALS

As a supervisor, you have three major responsibilities concerning technical materials. First, be sure they are available. Your shop cannot operate properly or professionally without having the necessary technical materials. Second, keep your technical materials up to date. Out-of-date technical materials, in addition to causing inconveniences, may result in harm to equipment or personnel. Third, require your subordinates to use their technical materials, both on the job and to prepare for advancement.

Observing your responsibilities toward technical materials will not just make you a better professional. It will also demonstrate to your subordinates proper professional and supervisory attitudes.

In chapter 2 of this manual, we will discuss more on the care and use of technical materials.

SOURCES OF INFORMATION

You and your subordinates should know which references to consult for detailed, authoritative, up-to-date information on all subjects related to both the naval requirements and the Electronics Technician occupational standards. Most of the publications discussed here are subject to change or revision from time to time-some at regular intervals, others as the need arises. When using any publication that is kept current by changes, be sure you have a copy in which all official changes have been entered. Official publications and directives carry abbreviations and numbers that identify the source and subject matter of each document. For instance, the identification number for this training manual is NAVEDTRA 12410. The term *NAVEDTRA* means it is published by the Chief of Naval Education and Training.

Some of the NAVEDTRA and NAVPERS publications described here are essential to personnel learning to perform the duties of their rating or seeking advancement. The others, although not essential, are very helpful.

The following **publications** and **nonresident training courses are usually required for advancement:**

Training manuals (TRAMANs). Most training manuals have two purposes. First, they are written to help personnel perform the duties of their rating. Second, they may be used to help personnel study for advancement. Some courses are general in nature and are intended for use by more than one rating. Others, such as this TRAMAN, are specific to a particular rating, The courses and publications appropriate to ETs are as follows.

These TRAMANs are specially prepared to present information based on the **naval standards:**

1. *Basic Military Requirements,* NAVEDTRA 12043
2. *Miltiary Requirements for Petty Officer Third Class,* NAVEDTRA 12044
3. *Military Requirements for Petty Officer Second class,* NAVEDTRA 12045
4. *Military Requirements for Petty Officer First Class,* NAVEDTRA 12046
5. *Military Requirements for Chief Petty Officer,* NAVEDTRA 12047
6. *Military Requirements for Senior and Master Chief Petty Officer,* NAVEDTRA 12048

These TRAMANs, which present information based on the ET **occupational standards,** are **specific** to the ET rating:

Electronics Technician 3 &2, NAVEDTRA 10197. Most of the information given in the *ET Supervisor*

manual is based on the assumption that you are familiar with the contents of *Electronics Technician 3 & 2.*

ET Supervisor, NAVEDTRA 12410. This is the training manual you are studying now.

It provides information you will need as you perform the tasks stated in the occupational standards for ET1 and ETC.

The following **publications are recommended for basic information and for advancement.** Some of the training manuals your subordinates may need as they learn the requirements of their job and prepare for advancement are discussed briefly in the following paragraphs. For a complete listing of training manuals, consult the current *List of Training Manuals and Correspondence Courses,* NAVEDTRA 12061.

Navy Electricity and Electronics Training Series (NEETS), a NAVEDTRA series consisting of several different books. NEETS consists of officer-enlisted correspondence course assignment booklets and modules (texts) that present electrical and electronic subjects on a basic, introductory level. These modules and courses may be studied sequentially from the beginning or as individual units on specific subjects, such as radar or microelectronics.

Mathematics, volumes 1, 2-A, 2-B, and 3, NAVEDTRA 10069-D1, 10062, 10063, and 10073-A1, respectively. Volume 1 provides a review of basic arithmetic and elementary algebra; it includes fractions, decimals, percentages, exponents, radicals, and logarithms. It also contains exercises in factoring polynomials, linear equations, ratio, proportions, variation, complex numbers and quadratic equations. It presents brief introduction to plane figures, geometric construction, and trigonometry. Volume 2-A is general in nature. Its subjects include definitions, notations, and computations with logarithms; trigonometric ratios, analysis, applications, and aids to computations; trigonometric identities; and vectors and forces. Volume 2-B is also general in nature. Its subjects include straight lines, conic sections, tangents, normals, slopes; introduction to differential and integral calculus; combinations and permutations; and introduction to probability. Volume 3 provides knowledge in elements of digital computer mathematics–sequence and series, induction and binomial theorem, statistics, number systems, sets and subsets, Boolean algebra, matrices, and determinants.

Tools and Their Uses, NAVPERS 10085-B2. This training manual covers general uses and approved safety procedures for Navy hand tools. It also includes safety precautions, operating practices, and care of common power tools; operating principles of measuring instruments and techniques of measurement; and types of fastening devices and procedures for using them. It discusses procedures for sharpening cutting tools; metal cutting operations and procedures; and techniques of miscellaneous tasks, such as flaring metal tubing, removing broken bolts, stripping insulated wire, soldering, and lubricating.

Blueprint Reading and Sketching, NAVEDTRA 10077-F1. This TRAMAN discusses uses and kinds of blueprints, language of blueprints, technical sketching, and gives extensive coverage to electrical and electronic prints. It includes chapters on piping, machine, sheet metal, structural, and architectural prints.

You are probably thoroughly familiar with the **Electronics Information Maintenance Books (EIMB)** series of reference publications. However, from time to time you should review the series, especially the General Information Handbooks. (Specifically, this is a series of books consisting of the EIMB *General, Installation Standards, Electronic Circuits, Test Methods and Practices, Reference Data, EMI Reduction, and General Maintenance books.)* As you review these books, pay special attention to appendices and other portions of the books you might have overlooked.

OCCUPATIONAL STANDARDS AND ADVANCEMENT STUDY BIBLIOGRAPHY

Naval Education and Training Program Management Support Activity (NETPMSA), located at Pensacola, Florida, publishes a very useful set of pamphlets with information taken from the Manual of *Navy Enlisted Manpower and Personnel Classifications and Occupational Standards,* NAVPERS 18068, and the *Bibliography for Advancement Study,* NAVEDTRA 10052. The pamphlets, issued yearly, are titled Advancement *Handbook for Petty Officers.* Each rating has its own pamphlet, which lists requirements specifically for that rating. Besides listing the occupational standards and the source materials related to those standards, the pamphlets also contain general information on advancement. Individuals studying for advancement should read and study all sources listed in the bibliography. Examination questions are based on all sources listed, whether they are required or only

recommended. The pamphlets are available through your ESO. Be sure your division personnel receive copies to use as they study for advancement.

As you prepare for advancement to ET1 or ETC, you may wish to study *Shipboard Electronics Material Officer,* NAVEDTRA 10478-B. This officer text/course is an excellent source of information you will need as a manager and an administrator in electronics. This course is not mandatory, but is highly recommended. (Do not procrastinate, order it now!)

REFFRENCES

Military Requirements for Petty Qfficer First Class, NAVEDTRA 10046-A, Naval Education and Training Program Management Support Activity, Pensacola, Fla., 1987.

Military Requirements for Senior and Master Chief Petty Officer, NAVEDTRA 10048-A, Naval Education and Training Program Management Support Activity, Pensacola, Fla., 1988.

Personnel Qualification Standards (PQS) Manager's Guide, NAVEDTRA 43100-1C, Naval Education and Training Support Center, San Diego, Cal., 1987.